

# FROM THERAPY TO TECHNOLOGICAL ENHANCEMENT: A SOCIO-ETHICAL PERSPECTIVE

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## Abstract

*The classical distinction between the natural and the artificial is gradually losing its original sharpness. Biotechnology can be used not only for therapeutic purposes but also to enhance human cognitive, emotional, moral, or physical abilities. This article discusses three of the most important socio-ethical issues related to the impact of neuroenhancement on individuals and on society. It closely examines threats to the principle of autonomy in the case of two selected technologies for neuroenhancement: the Brain – Computer Interface and gene technologies applied to the enhancement of other beings. The article also discusses the influence of social pressure on autonomous decision-making by individuals and whether social pressure is a sufficient reason for not accepting neuroenhancement. Finally, within the context of many concerns about the widening of social inequality as the result of the spread of enhancement practices, this article examines whether such disparities can be avoided and whether the principle of equal opportunities can be regarded as a sufficient criterion of equality.*

**Key words:** biotechnology, neuroenhancement, individual autonomy, equality and fairness, principle of equal opportunities, principle of equality of capabilities

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## Introduction

Human enhancement by improving our biological dispositions is no longer the distant vision of the future. With the dynamic development of biotechnologies, deepening scientific knowledge has contributed to the discovery of new effective diagnostic and therapeutic methods, and it has opened up the possibility of the targeted enhancement of physical, cognitive, emotional, and character traits in individuals by means of biotechnological interventions in human bodies (Bostrom, 2018, p. 92; Bostrom & Sandberg, 2009). To meet these goals, use can be made of relatively rapidly established pharmacological substances (DeGrazia, 2000; Elliott, 1998; Kramer, 1993), emerging neurotechnological methods (Clausen, 2008), and gene-editing technologies (Doudna & Sternberg, 2017). The dynamics of their development rightly draw attention to the possible consequences of optimization processes on individuals and on society (Talbot & Wolf, 2006).

The aim of this paper is to explore the expected ethical and social implications of neuroenhancement in three selected areas. We will focus on 1. the possible threats

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to the principle of autonomy in the case of closed-loop Brain-Computer Interface technology and also gene technologies applied to the enhancement of other beings; 2. the increasing social pressure to enhance; and 3. the deepening of social inequality and the associated problems of distributive justice. While medical interventions mostly rely on the principle of informed consent, whereby serious procedures affecting the body are decided upon by the patient, a detailed analysis of neuroenhancement – and in particular the impact of selected technologies – reveals the problematic nature of the concept of autonomy in such a situation. Is it legitimate to accept neuroenhancement methods if they are in conflict with the principle of autonomy? Since neuroenhancement will likely increase the cognitive and emotional competence of its users, thereby increasing their chances of social advancement, it can be expected that social pressure will increase on individuals to undergo neuroenhancement in order to improve their performance. How can increasing social pressure affect autonomous decision-making and individual behaviour? Is social pressure enough to justify the inadmissibility of neuroenhancement? In terms of the expected socio-ethical implications of neuroenhancement, concerns about widening social inequalities and the broader context of growing socioeconomic disparity cannot be overlooked, especially if neuroenhancement, which will create a competitive advantage for those who make use of it, is not readily available to everyone. The question is how widening social inequalities can be avoided and whether the principle of the equality of opportunity can be considered to be a sufficient criterion for assessing equality in a given situation. An analysis of these issues – which are among the most debated socio-ethical aspects of neuroenhancement – form the core of this article.<sup>2</sup>

### **Issues of personal autonomy**

When contemplating the adherence to and respect for the principle of autonomy, bioethical discourse relies on the liberal tradition, which understands autonomy as the right of adults to lead their own lives and make important decisions according to their own preferences, values, and plans so long as they do not harm others (Mill, 1864 [1859], p. 27; Hill, 2004, pp. 178-189). Two aspects are essential in this concept. One is the right of the individual to determine their own sovereignty – i.e. without coercion, manipulation, or compulsion. The other is recognizing the right to self-determination for others and preventing their rights from being undermined. A key question in the present context is whether enhancement interventions in the central nervous system can threaten an individual's autonomy. The issue of autonomy in medicine is largely discussed through informed consent. This means that, upon the basis of the professional information provided, an individual decides whether to undergo medical intervention in their body by expressing their agreement or disagreement with a proposed intervention. From this perspective, the principle of autonomy would not be violated in enhancement interventions if specific procedures are preceded by the informed consent of the person they will affect.

It is worthwhile looking closely at two cases of possible limitations of personal autonomy in relation to the use of two selected neuroenhancement technologies. The first case concerns the use of an integrated neuromodulation system (a closed-loop Brain-Computer Interface) based upon a close symbiosis between a human and a technical device which influences the mental performance of that individual as part of their mutual interaction with the technology – which can detect the potential electrical activity of the brain and process it using algorithms to perform a stimulation. These algorithms work by self-learning (machine learning), so they evaluate the situation independently with no human assistance (Schulze-Bonhage & Ball, 2009, pp. 38-40). By examining previous

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<sup>2</sup> This article builds on several years of research by the present author, and it presents an expanded and systematized version of this work. See Tomašovičová (2021a, 2021b).

data, they then make predictions of future events and propose the extent of stimulation. As electrical impulses, their evaluation then has an influence on human decision-making and actions. Here, a key question worth asking is whether the autonomy of the individual, whose performance would be influenced by a closed-loop neuromodulation system, is placed under threat.

Using this system may be problematic with regard to the principle of autonomy for at least two reasons. One reason is that the direct stimulation of selected parts of the brain takes place without the involvement of the user's control mechanism, such as the sensory apparatus. This means that electrical signals are sent directly to the brain without the user being aware of this and without them correcting this if necessary (Merkel, 2019, pp. 75-78). The second reason is that the data analysis, the prediction of events, and the subsequent intensity of stimulation are fully within the competence of the controlling technical device, which works automatically upon the basis of self-learning. As these analyses and predictions directly affect an individual's actions, the reasons given can be interpreted as a form of interference with the individual's autonomy, and it is necessary to evaluate the use of such a system purely for enhancement purposes; however, this does not automatically exclude all possible applications. The therapeutic use of an integrated neuromodulation system enables patients with epilepsy to prevent the onset of seizures and stabilize their condition, and so the benefits of using the device may outweigh any potential risks for the patient in terms of the principle of healthcare delivery. Patients with severe paralysis benefit from such technology because it often provides them with the only possible communication with their surroundings (Nijboer et al., 2009, pp. 51-62); however, even with therapeutic use, side effects such as the impairment of a patient's mental capacity and the development of aggressive behaviour, which became clear with the therapeutic use of the older (open-loop) system, need to be carefully tracked (Galert, 2016, p. 104). This means that, even in cases of therapeutic potential, it is appropriate to continually consider and evaluate, both from a medical and an ethical perspective, the benefits and risks associated with the integration of technical devices into the human brain; this understandably, applies to respecting the principle of autonomy too.

The second case of the limitations of personal autonomy concerns the use of gene technology for enhancement purposes; this relates to improving the basic cognitive and emotional abilities of future generations, whose parents are seeking the best start in life possible for them. Relevant objections have been formulated by several authors, most notably Joel Feinberg and Jürgen Habermas, who assert that genetic enhancements performed on other beings without their consent violate the principle of autonomy (Feinberg, 1980, pp. 124-153; Habermas, 2005 [2001], p. 100). They are an outside intention that is written into the genetic information of a living being, which is problematic for several reasons. First of all, this cannot be reversed in a simple way, because the change takes place at the level of the genes themselves. Secondly, there is a lack of legitimacy because the intention is not the result and accepted consensus that emerges from a prior communicative agreement with the affected living being (Habermas, 2005 [2001], p. 106). Thirdly, it violates the moral requirement of an "end in itself" (Kant, 1906 [1785], p. 54) because the being in question becomes an instrument for the fulfilment of the visions of others.

Some scholars challenge these concerns by highlighting the process of upbringing and socialization, where children are shaped according to their parents' preferences; while in many cases this limits the children's freedom, the process is not outrightly rejected (Buchanan, Brock, Daniels & Wikler, 2009, pp. 267-295). In the process of socialization, children have the opportunity – even retrospectively – to defy those expectations of others that they find unacceptable and to choose their own path, but in genetic pre-programming this opportunity to reverse the set programme is absent. There is no communicative space here to give the other being a chance to say "no" (Habermas, 2005

[2001], p. 107). Unsurprisingly, this limitation of personal autonomy is one of the most discussed issues in the debate on the acceptability of genetic enhancement for future generations – the “designing of children”.

Nonetheless, as with other technologies, genetic modification requires a more precise differentiation. For example, in the case of therapeutic gene editing at the somatic level to prevent future serious disease, it can be reasonably assumed that the person concerned will at least consent to the clinical intervention, thereby reducing any conflict with their personal autonomy. Any concerns that the principle of autonomy may be compromised are directed at genetic interventions in the germ line, which would affect future generations, and which are prohibited by a temporary moratorium and, in several countries, even by legislation (Sýkora, 2019).

Such threats to autonomy because of enhancement interventions show that certain technological practices may be questionable with respect to the principle of autonomy. These include integrated neuromodulation systems and the primal genetic enhancement of future children. Advocates of neuroenhancement have turned their attention to non-invasive neurotechnological methods and pharmacological substances which rely on the user’s autonomous decisions, thus avoiding a possible conflict with their autonomy. Nonetheless, they also predict that the interest in neuroenhancement will likely grow as technologies continue to improve.

### **The increasing social pressure for enhancement**

Along with the expected spread of neuroenhancement, there has been a rise in concerns within relevant philosophical research in terms of the possible socio-ethical implications that would result from increasing social pressure. These concerns are based on an assumption that enhancements in cognitive and emotional skills would create capability advantages for users over others competing in the labour market, increasing the pressure for higher performance even among those who, for whatever reason, refuse these enhancements. It is worthwhile here distinguishing between implicit social pressure, which an individual can freely reject, albeit at the cost of not having an advantage in the competition for limited resources (e.g. in the labour market, sport, or science), and explicit social pressure as an outright demand for enhancement in order to perform better (e.g. in the military). Ultimately, individuals will either accept the risk of the disadvantage, or they will have to adapt and undergo enhancement in order to avoid facing a lack of opportunity (Galert et al., 2009; Lachenmeier, 2017, pp. 69-108). Nonetheless, decision-making under the pressure of social expectations actually limits the space for individual self-determination. The question thus arises as to whether social pressure is a sufficient reason for the ethical or legal impermissibility of neuroenhancement.

When looking at this matter, it is worthwhile considering whether a decision for neuroenhancement is voluntary or involuntary – given that voluntariness is a prerequisite for attributing responsibility for an action. Voluntariness is a binary concept in legal terms, and it allows an individual to make a decision or to choose from available options (Gutmann, 2017, p. 35); however, this does not mean these options must be unlimited or equivalent. Even a choice between limited and restricted options has a degree of voluntariness. Similarly, it does not exclude actions or decisions that are influenced by other people; it merely assumes there is the possibility of taking an independent stance towards any influence (ibid, p. 35). Social pressure mostly allows an individual to choose from options, albeit more narrowly defined or limited ones, and therefore it cannot so easily be identified with coercion – which excludes voluntariness (Mona, 2017, p. 57). Considering this reasoning, if social pressure for improvement therefore allows an individual to choose – even from limited options – and it is not coercive, then there is no sufficient reason for any normative intervention on enhancement in the form of a prohibition.

Examining this argument, however, opens up the following dilemma: social pressure for improvement narrows the space of alternative possibilities and for individual self-determination. But trying to eliminate social pressure by prohibiting enhancement altogether would also be a restriction of autonomy and the right to self-determination. According to Thomas Gutmann, achieving paternalistic protection is only possible at the cost of limiting autonomy; therefore, its use to address a situation must be viewed with caution (Gutmann, 2017, p. 43).

### **Deepening social inequality and distributive justice**

The social problems associated with cognitive enhancement relate primarily to issues of equality and distributive justice. The starting point for this is based on the assumption that cognitive enhancement will enable its users to grow in competence and increase their advantages in competing for job opportunities. Since enhancement (unlike therapeutic procedures) is not supposed to be covered by public health insurance, which is primarily intended to cover the costs of curing and treating diseases, it can be assumed that it would not be equally available to everybody. The already disadvantaged lower social class would not be able to afford it. Unequal access to enhancement may thus lead to an inequality of opportunity, and there are growing concerns about increasing social inequality and the widening of socioeconomic disparities.

In this context, advocates of cognitive enhancement argue that society already accepts private education and supplementary courses that only the children of well-off parents can afford. This qualitatively superior type of education significantly expands children's cognitive abilities and improves their initial conditions for employment (Caplan, 2009, pp. 165-168). Inequality as unequal access to the acquisition of cognitive abilities is already present in society; according to Arthur Caplan, there is no fundamental difference between the "enhancement" acquired through an exclusively private education and technical enhancement (2009, p. 167). If we accept the former, despite there being unequal access to it, why should we disqualify the latter for the same reason? The possible disadvantage of the underprivileged is therefore not a reason to prohibit or restrict enhancement but is rather a stimulus to correct existing developments and their effects on the disadvantaged.

A mechanism of correction to eliminate initial social inequalities and ensure the equality of opportunity was discussed by John Rawls in his theory of justice. This mechanism of correction has more recently been adopted by several advocates of enhancement. Rawls dealt primarily with the fair equality of opportunity: "[F]air equality of opportunity is said to require not merely that public offices and social positions be open in the formal sense, but that all should have a fair chance to attain them" (2001, p. 43). This means that it is not sufficient to simply formally declare equal rights to education and to social positions; it is necessary to also ensure fair accessibility to them. Factors affecting equality of opportunity, and which enter the game as its preconditions, must also be considered. According to Rawls, these factors are mainly social and natural. This concerns the social origins and status of the families into which people are born and which they grow up in alongside the biological preconditions manifested in the diversity of their talents and physical qualities (Rawls, 2001, p. 55). Rawls considers these factors to be morally arbitrary because no individual has personally contributed to them.<sup>3</sup> Even in a well-ordered society, they tend to cause problematic inequalities and cannot be ignored; a system of regulations must therefore be established to help eliminate this natural "lot-

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3 "Do people really think that they (morally) deserve to be born more gifted than others?" (Rawls, 2001, p. 74). According to Rawls, the distribution of innate ability is undeserved because "moral desert always involves some conscientious effort of will, or something intentionally or willingly done" (Rawls, 2001, p. 74, footnote 42).

tery" (Rawls, 2001, p. 56). According to Rawls, it would be unfair if equally or similarly talented individuals were less likely to succeed and develop their talents simply because they came from inferior social backgrounds. He proposes a system of compensation that would ensure an equality of starting conditions in education and employment: "[A]ssuming that there is a distribution of natural assets, those who are at the same level of talent and ability, and have the same willingness to use them, should have the same prospects of success regardless of their initial place in the social system" (Rawls, 1999, p. 63). For a society to avoid increasing social inequalities, Rawls proposed the introduction of a system of compensation in the form of equalizing initial opportunities.

If cognitive enhancement – as a technological or pharmacological change to natural biological dispositions – enters into this situation of rule setting for the fair functioning of society, it is necessary to take this factor into account as something with a real impact on the equality of opportunity; however, the possibility of state support that would mitigate unequal access to enhancement, as in the case of equalizing educational opportunities, interferes with one pillar of liberal theory – namely, the state's neutrality in relation to different individual and partial conceptions and preferences for a good life. Supporting only those goods which are generally necessary for people to develop adequately as members of society and to realize their life ambitions would be compatible with neutrality. Rawls defines these as "primary goods", and he argues they should be distributed to one and all (Rawls, 2001, pp. 58-59).

In response to the newly emerging situation associated with cognitive enhancement – and analogous to Rawls's idea of "social" primary goods – Allen Buchanan, Dan Brock, Norman Daniels, and Daniel Wikler developed the argument that a person's cognitive abilities can be considered a "natural" primary good because cognitive abilities are necessary for the realization of an individual's ideas and life plan and are important for successfully implementing almost every life project (Buchanan et al., 2009, pp. 278-281).<sup>4</sup> The loss or lack of such abilities threatens almost all life plans. According to Buchanan et al., cognitive abilities are general-purpose means, which are necessary for every purpose. Upon this basis, it can be concluded that an appropriately set social programme could support the enhancement of cognitive abilities in people who are socially disadvantaged. This would regulate and equalize their starting opportunities. Even if one accepts Rawls's assertion that natural biological dispositions are not morally meritorious, as they are not the results of individual endeavour, supporting cognitive enhancement for the less talented can correct the impact of the natural lottery. Once cognitive enhancement is launched, the theory of the widening of socioeconomic disparities need not be fulfilled. Rather, it could be prevented by supporting the disadvantaged while not restricting the privileged (Galert et al., 2009, p. 8).

Several critical comments must, however, be made about the reasoning outlined above. Firstly, there is no getting around the fact that the principle of equal opportunities has certain limits. It does not sufficiently consider those people who are unable to grasp and take advantage of the equality of opportunity due to various limitations and disabilities that are not of their own making. Disabled, sick, and elderly people are more likely to have special needs and demands resulting from various health and biological factors. They also require a guarantee of "special opportunities" to lead a valuable and dignified life. Despite this, they are not explicitly dealt with in Rawls's theory of justice, and they are not part of compensatory measures. The proposed principle of equality of opportunity, thus, does not function as an adequate criterion of equality.

Secondly, the principle of equality of opportunity is unlikely to be a sufficient criterion of equality for those who refuse enhancements for various reasons. The risks of their possible discrimination and the potential sources of associated tension in society should not be underestimated and left unnoticed. They pose a challenge in the search

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4 Also see Buchanan et al. (2000) and Buchanan (1995).

for effective tools to regulate possible inequalities caused by cognitive enhancement.

Thirdly, there is a failure to fully ensure the fair equality of opportunity – even under current circumstances, where significant income disparities are tolerated. This increases the chances for certain individuals to socially benefit from their position. Increased caution in introducing technical advancements due to the potential risks of widening inequality is justified and legitimate given the overall functioning of society. This is not a fundamental reason to restrict research in cognitive enhancement; however, it is a good reason to carefully examine its possible implications.

The above suggests that a solution to unequal access to enhancement, relying in particular on Rawls's argument and its updated version (Buchanan et al., 2000), could be found in the introduction of a system of compensatory measures to even out unequal initial social conditions; however, such a proposal does not deal with the situation of people who are medically disadvantaged and for whom guaranteeing an equality of opportunity is not a sufficient solution due to their increased and legitimate demands for dignified functioning. It also leaves the question – whether people from disadvantaged social backgrounds – for whom the compensation would be intended – would refuse enhancement for various reasons rather than choosing it - open. How can there be an assurance that no groups of people would be excluded from fairness and equality? How can the potential for discrimination be prevented and the preconditions for a two-class society be eliminated? Starting from this broader context, equality is a much more complex issue and should not be reduced to a simple matter of unequal access to enhancement. In the next section, this chapter examines whether a method based on the assumption of the diversity of human existence – and which does not aspire to reduce or overlook this diversity in any way – is a more appropriate framework for considering equality in the context of human enhancement.

### **Equality and the capability approach**

Given such reservations, all forms of human existence must be considered in setting the rules for a justly functioning society. Reasoning cannot be narrowed – as Rawls did – to subjects who are autonomous and rational, and who “under the veil of ignorance” (Rawls, 1999, p. 118) can clearly articulate and defend their own interests. The disabled, the socially excluded, the sick and elderly, and, soon enough, even the enhanced and unenhanced are all legitimate parts of society. Various forms of human existence must be taken into account when considering equality and justice. If one was to start from this assumption of human diversity, then this results in the insufficiency of the criteria that are aimed at ensuring an equality of opportunity or an equality of primary goods; the capacities to convert these acquired goods into a valuable way of being substantially vary for different forms of human existence (Sen, 1980, p. 219). The Indian economist and philosopher Amartya Sen was one of the first scientists to draw attention to this when he proposed assessing equality in terms of basic human capabilities – i.e. the real possibilities and freedoms of individuals to achieve valuable social functioning (Sen, 1992, p. 40).

Arguing against Rawls's theory of justice, Sen asserts that the index of primary goods is not a sufficient measure of equality. Even though primary goods are conceived broadly and inclusively – as they include basic rights and freedoms, opportunities, income, wealth, and the social foundations of self-esteem – Sen states that attention should not be placed on the goods themselves. Nonetheless, an essential aspect that is absent from Rawls's approach is the focus on the relationship between goods and people. This means observing whether these goods actually enable people to lead worthwhile and dignified lives (Sen, 1980, p. 216). This aspect is important for the reason that people are very different (Sen, 1980, p. 219). Given their health, age, intelligence, social conditions, and other conversion factors, their ability to use abstract resources to achieve realistic opportunities to live and function with dignity and value varies substan-

tially. The same distribution of resources would be inadequate for people with disabilities who have legitimate increased demands and needs due to their illnesses (Bickenbach, 2014, p. 12). Taking into account the forms of human existence, Sen asserts that resources and primary goods, on their own, cannot be a sufficient indicator of equality and justice. Resources should not be the goal of society's efforts but rather a means to valuable goals.

The main reason for Sen's critique of Rawls's theory of justice was the lack of the consideration of human life in its plurality of forms. He obligingly notes that if people were so similar, then Rawls's fair distribution of primary goods – and guaranteeing the equality of opportunity – could presumably function as an adequate measure of equality. Interpersonal differences, however, are now so significant that overlooking them leads to a partially blind morality (Sen, 1980, p. 216). In the context of possible enhancements in human cognitive abilities, it is reasonable to assume that these interpersonal differences will continue to grow significantly. The question of determining the relevant criterion of equality, especially in light of the possible widening of inequalities and differences between people in the near future, is therefore a fully legitimate one for a justly functioning society.

The question then is: If it turns out that neither the equality of resources or primary goods (egalitarianism) nor the equality of opportunity are sufficient criteria for equality when considering human diversity, what other (more appropriate) criterion can be considered? Sen observes that the prerequisite for valuable social functioning – the precondition for a good life for any form of human existence – is its capabilities: i.e. the actual possibilities of leading a dignified life. These capabilities represent the real possibilities of a human being and the freedom of that individual to do and be what they have a reason to value (Sen, 1980, 1992). These possibilities are created by internal and individual preconditions (e.g. health, age, and talent) and external (social, economic, political, and environmental) ones alongside other factors. Naturally, the spectrum of capabilities is vast; not all of them are equally important, which is why Sen proposes assessing equality by taking into account individuals' basic capabilities. These are capabilities that can be considered essential for a dignified life and that enable a person to avoid poverty, deprivation, and conditions unworthy of a dignified life (Sen, 1980, 1992).<sup>5</sup> The specification and particular definition of these basic capabilities should be decided by each society or culture as an open public discourse. This would indicate what a society considers to be the conditions for achieving a worthy and dignified life. Sen does not create a universal "theory" of justice as such but rather identifies a conceptual framework that allows for the assessment of the extent of human inequalities, poverty, and deprivation in real time and space, and which proposes specific social measures to eradicate them. This framework is defined by two poles: capabilities and function (meaning the real fulfilment of the capabilities). When assessing equality, the focus is on core capabilities. Out of a set of capabilities, what an individual undertakes and accomplishes is the result of their own free choice (Sen, 1992, p. 49).<sup>6</sup>

Unlike Sen, the philosopher Martha Nussbaum has tried to directly identify a list of ten central human capabilities she considers to be constitutive of a dignified human life

5 Giorgio Agamben also draws attention to the need for increased caution in assessing human life. This cautionary note is important so that the mistakes of the past are not repeated and so society does not slip back into distinguishing between those lives that are worthy of living and those that are not (Agamben, 1998).

6 The United Nations Development Programme has used a capability-based approach in the design of its annual Human Development Reports. This approach provided a broader framework for assessment, emphasizing the expansion of human opportunities and freedoms in achieving worthwhile goals, thus providing a balance to narrowly defined economic indicators (Robeyns, 2006, p. 351). For a more detailed discussion on the multiple dimensions of human development, see Alkire (2002, pp. 181-205).



and which she presents as a sufficient means of measuring social justice. Nussbaum refers to the dignity of life in terms of Aristotle's concept of the good life ("human flourishing"). This means that humans are guaranteed certain basic conditions for survival and dignified living. These conditions, termed by Nussbaum as "central capabilities", are so essential that without them human life would be impoverished (Nussbaum, 2011, p. 31). These central capacities must be seen as mutually irreplaceable. They are all equally important, and one cannot be a substitute for another. According to Nussbaum, these are: "life; bodily health; bodily integrity; senses, imagination, and thought; emotions; practical reason; affiliation (interpersonal association and the social bases of self-respect); other species; play; [and] control over one's environment (political and material)" (Nussbaum, 2011, pp. 33-34). They are deliberately formulated in an abstract way to make it clear that a basic normative framework for a decent and just society is necessary; this framework must also remain flexible and open for possible additions, further specifications, and revisions based upon cultural particularities and social consensus.<sup>7</sup> The essential consideration is that the list provides a philosophical basis for a just society which should at least guarantee its citizens a threshold level of each capability through constitutional means (Nussbaum, 2006, p. 71). Given that these central capabilities are necessary conditions for a dignified life, Nussbaum asserts that they can therefore be interpreted as basic claims made by humans in relation to the state; they form a partial and minimal account of social justice (2006, p. 71).

The above analysis shows why the state should guarantee such necessities to its citizens. Nussbaum's argument is the principle of the dignity of every member of society. The principle of dignity – expanded by the Aristotelian dimension of the practical capability to lead a worthwhile life – requires that every person should be guaranteed a set of basic entitlements necessary for social functioning. At the same time, the capability approach implies that equality cannot be linked only to the equality of resources and primary goods, or to the equality of opportunity. Neither the equality of resources nor the equality of opportunity can guarantee a valuable way of being and social functioning for everyone. A more differentiated approach in assessing equality is needed to make sure none of the aspects of human diversity are omitted.

In the context of human enhancement and the ongoing debate on the social implications of this phenomenon, the question of how a capability approach can contribute to this debate arises. This is even considering the fact that this deals with which fundamental pillars of society should be preserved and which should be rethought and rebuilt. In the context of human enhancement and its possible consequences for individuals and society, the capability approach is a more differentiated conceptual framework than Rawls's theory of justice and it lets previous considerations be extended for at least two reasons. Firstly, it considers human life in its various forms, and it creates the right conditions for eliminating diverse forms of discrimination and social exclusion; this refers to current forms as well as those that may arise in the near future, particularly in relation to unenhanced people. If a capability approach emphasizes the provision of basic capabilities in terms of fundamental legal rights for every member of society, it can reasonably be assumed that this will help to create and cultivate a social environment that is suitable for any form of human existence, and which removes elements of the potential discrimination or stigmatization of the most vulnerable groups.

Secondly, in the context of human enhancement, it is expected that demands will increase in society to recognize new and enhanced transhuman and posthuman life forms. Given the perspective of Rawls's theory of justice – where primary involvement was by

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7 Johann Roduit, Jan-Christoph Heilinger, and Holger Baumann examine the possibility of using central capabilities as a basic referential framework for guiding human enhancement (2015, pp. 622-630). Such an interpretation of central capabilities is questioned by Ivars Neiders (2019, pp. 85-102).

autonomous and rational subjects in the compilation of the conditions of society's functioning and the formulation of the criteria of coexistence based upon their own preferences and interests – it may be somewhat problematic for these subjects to accept and recognize the equality of different and enhanced beings in a society. This is problematic in the same way when incorporating the disabled and sick into Rawls's principles of justice. Still, if one looks at this situation from a capability approach, which respects human diversity at the outset, then it can be assumed that it will also provide enough room for the expansion and recognition of new kinds of equality. The coexistence of enhanced and unenhanced forms of life is likely to be one of the key issues for society in the near future. Sen's and Nussbaum's emphasis on diversity very much corresponds with the vision of the transhumanist Nick Bostrom, who argues that different types of existence with different enhancements will coexist side by side in the near future (Bostrom, 2009, 2018). According to Bostrom, the existence of different forms within a society does not automatically imply the breakdown of society, or slavery, but rather the need for a more intensive search for effective social solutions regarding the newly emerging conditioning factors (Bostrom, 2018, p. 97). As contemporary society is struggling to find and apply effective protective and regulatory mechanisms to redress inequalities, society will face a similar task. Meanwhile, the capability approach has enough potential to function as a conceptual framework, even within a new configuration of social relations in which social measures will be set up to prevent deprivation, respect diversity, and provide minimum basic capabilities to all forms of existence.

### **Conclusion**

Current developments in neuroenhancement show that increasing knowledge in fields of neuroscience and neurotechnology lets us uncover and describe the basic processes of the human brain and change them. Within this discourse, it is important for the focus to be on the research itself and on the early identification of possible negative or controversial impacts on individuals and on society. An examination of the socio-ethical implications of neuroenhancement shows that the limitation of the principle of autonomy becomes problematic in the case of the use of a closed-loop neuromodulation system and when gene technology is applied to enhance the abilities of other beings. Taking the expected widening of social inequalities into account, the question of setting a proper criterion for assessing equality remains an open one because, as the above analysis points out, the principle of equality of opportunity does not sufficiently consider the full extent of human diversity. A capability-focused approach seems to be a more appropriate framework for thinking about equality for at least two reasons. Its first consideration of the diversity of human existence creates the right preconditions for eliminating various forms of discrimination and stigmatization of vulnerable groups in society, including those who, for various reasons – even reasonable ones – will refuse to be enhanced. It also creates the right conditions to recognize new forms of equality, which will likely be a key social issue in the near future.

The presented findings, in this chapter, confirm that contemporary bioscientific knowledge is playing a significant role in shaping societal development. It changes the nature of society, influencing its social and political mechanisms, and therefore, it is necessary to shine a light on the changes in values and social practices this new knowledge brings. It is important, that the assessment of the potential ethical and social implications of such a complex phenomenon as neuroenhancement becomes a part of discussion about medical risks and that this debate is continued.

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